Salt River Project- Kyrene K7 Electric Generating Station, City of Tempe – Kyrene Water Reclamation Facility:

Tempe, Arizona

Delivering more than power.™

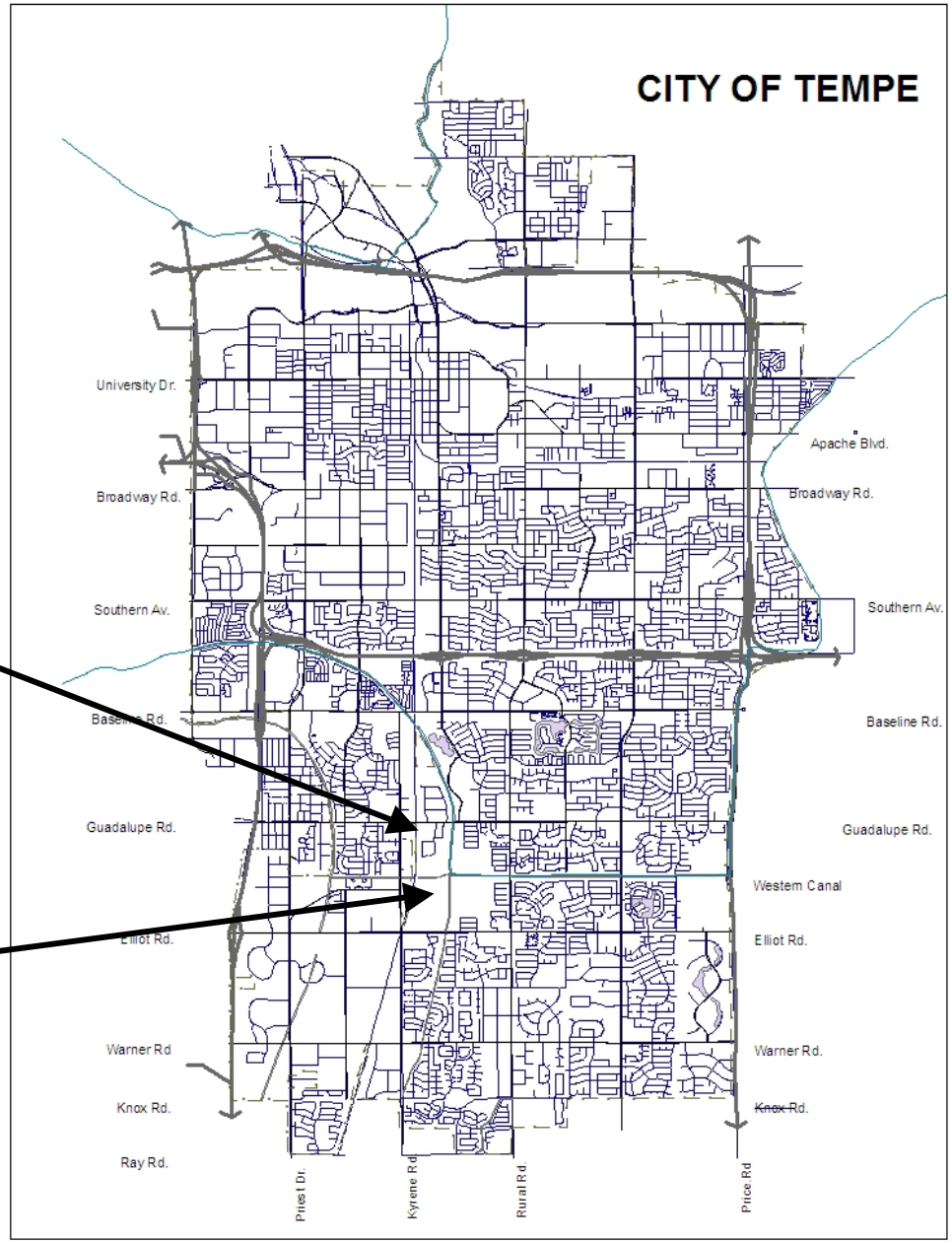
Tempe Kyrene Water Reclamation Facility

SRP K7 Electric Generating Station

Reclaimed Water Reuse and Water Exchange Program

December 5, 2005

Tempe Kyrene Reclamation Facility & SRP K7 Generating Station - Site Map



Tempe Kyrene Water Reclamation Facility (KRF)

Plant site approximately 10 acres in south Tempe

(Kyrene & Guadalupe)

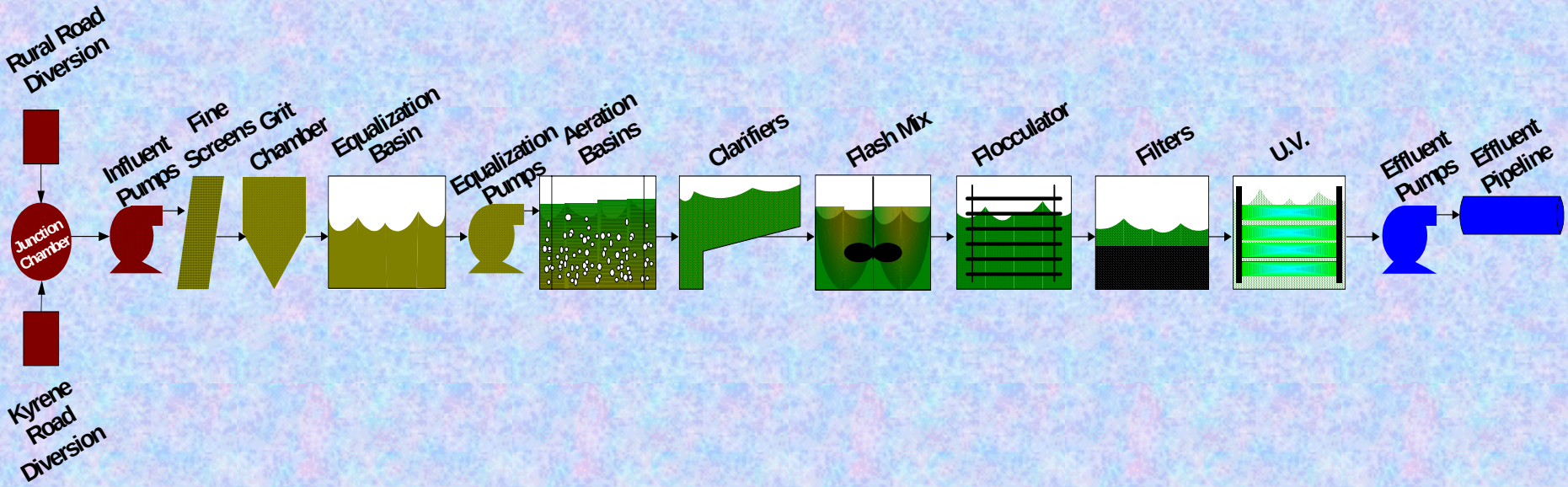
Tempe Kyrene Water Reclamation Facility History

Tempe, Arizona

- Reclamation plant constructed in 1991 – rated capacity = 3 MGD
- Reclamation plant optimization in 1996 - rated capacity = 4.5 MGD
- Satellite plant (solids handling @ regional 91st Ave. WWTP)
- Class A+ reclaimed water (de-nitrification)
- Limited initial opportunities for reuse (GC & athletic field – turf irr.)

Optimized KRF Plant Treatment Processes

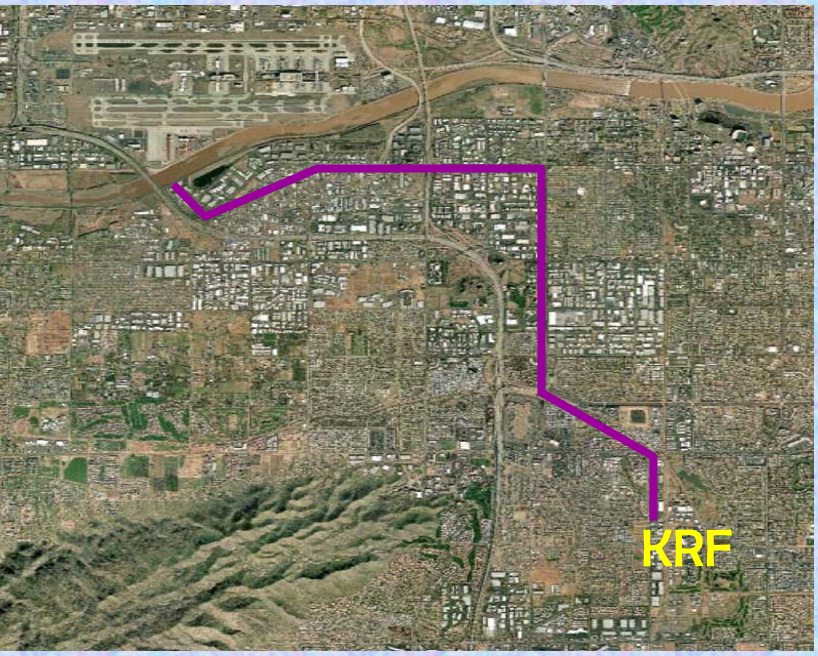
- Screening & grit removal
- EQ
- Biological process
- Jet aeration
- Secondary clarification
- Filtration
- UV disinfection
- Reuse/discharge



Current KRF Reclaimed Water Reuse Sites

1.) Ken McDonald Golf Course - GC irrigation
GW recharge (vadose zone RW)

2.) SRP Kyrene
Generating Station



3.) AZPDES discharge to Salt River

SRP Kyrene Electric Generating Station History:

- 1951–1954: SRP Kyrene Steam Plant begins operation at present site
- Electric generation capacity = 104 MW (2 steam generation units)
- 1971-1973: Three combustion turbine units added to Kyrene Plant
- Electric generation capacity increased to 250 MW (Natural gas or oil)
- 2000-2002: SRP Kyrene K7 Expansion Project adds one combined cycle unit
- Electric generation capacity increased to 521 MW
- New combined cycle unit utilizes natural gas
- Original steam generation units are reserved for emergency use

Original Units at Kyrene Generating Station

Kyrene K7 Expansion Combined Cycle Unit 250 MW

Brief History
Kyrene K7 Expansion Project

- Originally proposed as 850 MW facility

- Cooling Water Supply Options – 6440 af
  - Tempe reclaimed water
  - Groundwater – Type II
  - CAP water

Brief History
Kyrene K7 Expansion Project

- Intergovernmental Agreement between SRP and Tempe – June 2000

- 250 MW facility
- Reduced water requirements
- IGA provides for water supply and discharge negotiations
- Water supply negotiations pursuant to SRP/Tempe WDUA

Brief History
Kyrene K7 Expansion Project

- Certificate of Environmental Compatibilty – November 2000

➢ Approval to construct

➢ "Best effort" to use Tempe reclaimed water for cooling water

➢ To extent applicable, meet all requirements for use of groundwater

Tempe/SRP Water Supply Agreement –August 2003, as amended

- KEP K7 water requirements
  - 1800 – 2900 gpm (4 cfs - 7 cfs) *2,200 gpm avg.*
  - 2400 AF/yr average; 3550 AF/yr maximum

- Water Sources (priority)
  - Tempe reclaimed water (1st priority)
  - Tempe surface water (ASR)*
  - LTS credits (CAP water)*

* - *Multiple renewable water sources for back-up supply – recovery wells*

Tempe/SRP Water Supply Agreement –August 2003, as amended

- SRP K7 Discharge
  - Tempe storm drain
  - Gila Drain
- Operational Document
  - scheduling
  - measurement
  - monitoring
  - accounting
  - reporting

Priest Dr.
Kyrene Rd.
Rural Rd.
Guadalupe Rd.
KRF
Reclaimed water
Tempe Storm Drain Discharge
Gila Drain Discharge
KEP
2400 AF
Elliot Rd.

SRP Benefits

- Availability/Proximity
- Consistent supply
- Flexible supply
- Reliability/drought resistant
- Direct delivery by pipeline

SRP Benefits

- Renewable water supply – no groundwater use
- Least cost alternative
- Long-term commitment - Tempe shall be the Water Provider for KEP for 30 years
- Future - two consecutive 10 year renewable options

SRP Challenges

- Discharge permits
  - Arizona Pollution Discharge Elimination System
  - Aquifer Protection Permit

- Supply versus demand requiring on-site storage greater than anticipated

- Varying water quality on supply side requiring frequent water chemistry adjustments

Other Key Provisions of the SRP/Tempe Water Exchange Agreement:

- Water exchange provisions subject to terms and conditions of the SRP/Tempe WDUA (governing authority for water exchanges)

- SRP provides surface water exchange credits to Tempe for each acre-foot of reclaimed water Tempe delivers to the SRP K7 Unit

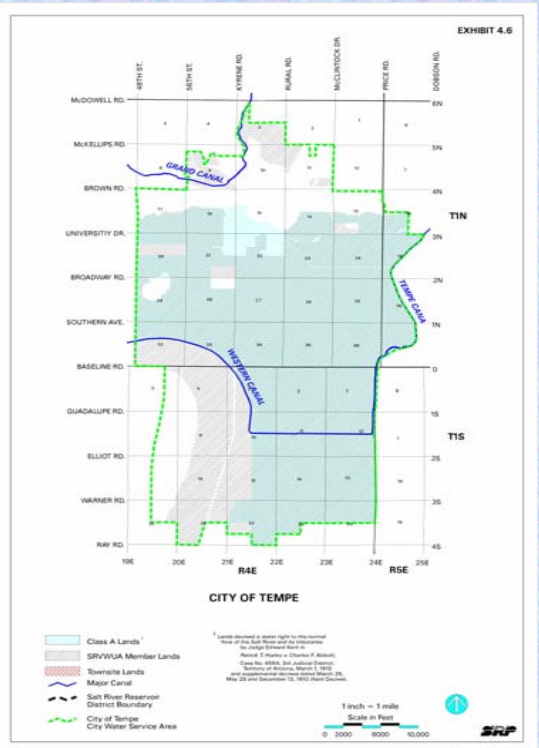
- Water exchange credits used for any combination of municipal water uses in the Tempe service area, including deliveries to non-member lands (non-SRP lands)

- Exchange rate = 4 AF surface water exchange credit for every 5 AF of reclaimed water through 2010, 1 to 1 exchange rate thereafter, until expiration of agreement

Tempe Benefits

- Convert reclaimed water resources to surface water exchange resources for potable water uses, or other direct delivery water uses

- Exchange supplies can be used to meet non-member land water demands



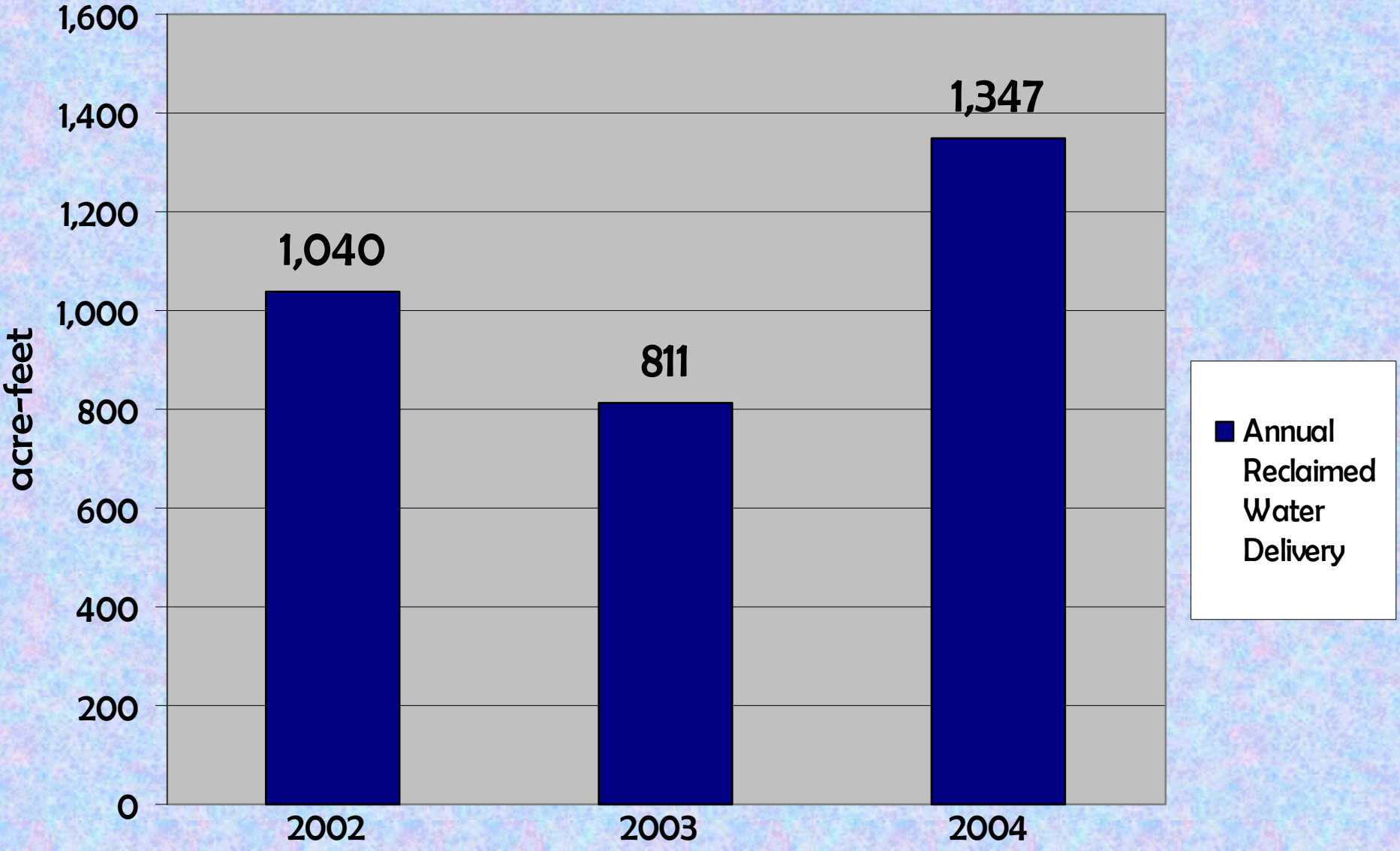
- Reduced costs for new water infrastructure for both parties

Tempe Benefits

- Flexibility: in low water demand periods @ SRP K7 (& other reuse sites) switch reclaimed water deliveries to Tempe GW recharge site

- Long-term water resources planning: conservation of surface water and groundwater resources through new opportunities to use reclaimed water

Tempe KRF - Annual Reclaimed Water Deliveries to SRP K7



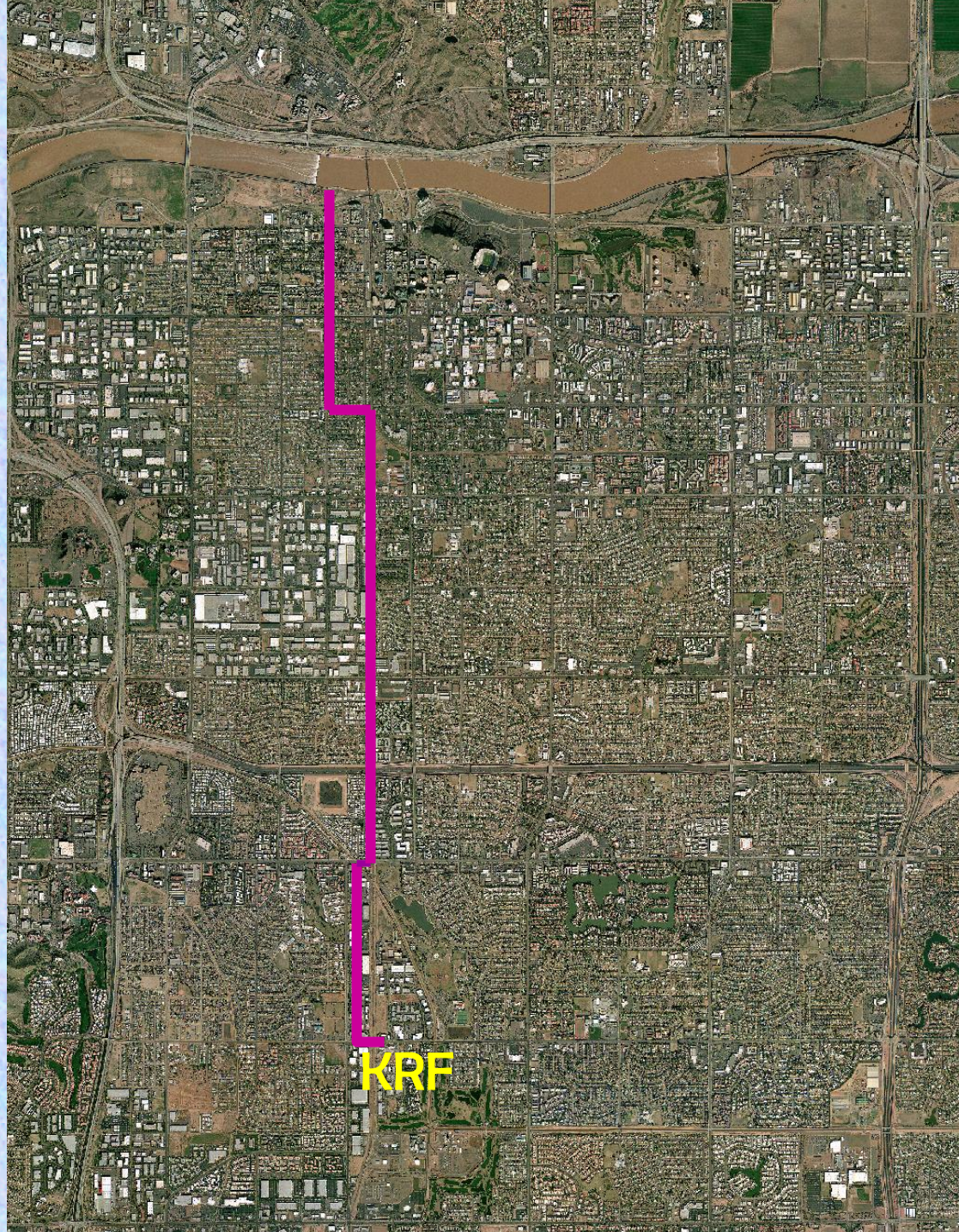
Tempe KRF Expansion Project & Upgrades

- Expansion in treatment capacity from 4.5 MGD to 9.0 MGD
- New membrane bio-reactor technology (*ultra-filtration membranes*)
- New wastewater diversion structures

Tempe KRF Expansion Project & Upgrades

- Improvements in reclaimed water quality & consistency
- New reclaimed water delivery pipeline

KRF Reclaimed Water Pipeline Alignment Study



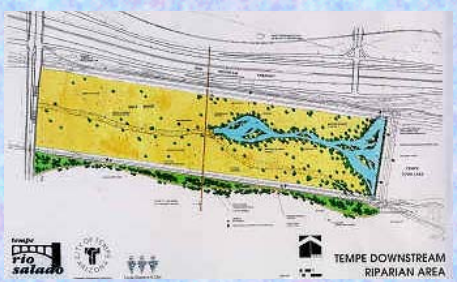
KRF – Potential new reuse sites for reclaimed water

•Expanded GW recharge facility @ KMGC

•Kiwanis Park – turf irrigation & lake

•Tempe Town Lake – supplemental water supply

•ASU Karsten GC/Tempe Rolling Hills GC – turf irrigation



•Rio Salado Riparian Habitat Restoration Project

•<u>Potential for new industrial reuse customers</u>

Questions?